



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/823,105 | 03/30/2001 | Guei-Yuan Lueh | 42390P11280 | 8390 |

8791 7590 03/15/2004

BLAKELY-SOKOLOFF TAYLOR & ZAFMAN
12400 WILSHIRE BOULEVARD, SEVENTH FLOOR
LOS ANGELES, CA 90025

EXAMINER

STEELMAN, MARY J

ART UNIT

PAPER NUMBER

2122

DATE MAILED: 03/15/2004

2

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/823,105

Applicant(s)

LUEH, GUEI-YUAN

Examiner

Mary J. Steelman

Art Unit

2122

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 30 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 March 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1-38 are pending.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a) because they fail to show Fig. 6, item 610, in Recompile 602, as described in the specification at page 16, line 9. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. Specification is lacking Cross-References to Related Applications:

Content of Specification

- (a) Title of the Invention: See 37 CFR 1.72(a) and MPEP § 606. The title of the invention should be placed at the top of the first page of the specification unless the title is provided in an application data sheet. The title of the invention should be brief but technically accurate and descriptive, preferably from two to seven words may not contain more than 500 characters.
- (b) Cross-References to Related Applications: See 37 CFR 1.78 and MPEP § 201.11.
- (c) Statement Regarding Federally Sponsored Research and Development: See MPEP § 310.
- (d) Incorporation-By-Reference Of Material Submitted On a Compact Disc: The specification is required to include an incorporation-by-reference of electronic documents that are to become part of the permanent United States Patent and Trademark Office records in the file of a patent application. See 37 CFR 1.52(e)

Art Unit: 2122

and MPEP § 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text were permitted as electronic documents on compact discs beginning on September 8, 2000.

Or alternatively, Reference to a "Microfiche Appendix": See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.

- (e) Background of the Invention: See MPEP § 608.01(c). The specification should set forth the Background of the Invention in two parts:
- (1) Field of the Invention: A statement of the field of art to which the invention pertains. This statement may include a paraphrasing of the applicable U.S. patent classification definitions of the subject matter of the claimed invention. This item may also be titled "Technical Field."
 - (2) Description of the Related Art including information disclosed under 37 CFR 1.97 and 37 CFR 1.98: A description of the related art known to the applicant and including, if applicable, references to specific related art and problems involved in the prior art which are solved by the applicant's invention. This item may also be titled "Background Art."
- (f) Brief Summary of the Invention: See MPEP § 608.01(d). A brief summary or general statement of the invention as set forth in 37 CFR 1.73. The summary is separate and distinct from the abstract and is directed toward the invention rather than the disclosure as a whole. The summary may point out the advantages of the invention or how it solves problems previously existent in the prior art (and preferably indicated in the Background of the Invention). In chemical cases it should point out in general terms the utility of the invention. If possible, the nature and gist of the invention or the inventive concept should be set forth. Objects of the invention should be treated briefly and only to the extent that they contribute to an understanding of the invention.
- (g) Brief Description of the Several Views of the Drawing(s): See MPEP § 608.01(f). A reference to and brief description of the drawing(s) as set forth in 37 CFR 1.74.
- (h) Detailed Description of the Invention: See MPEP § 608.01(g). A description of the preferred embodiment(s) of the invention as required in 37 CFR 1.71. The description should be as short and specific as is necessary to describe the invention adequately and accurately. Where elements or groups of elements, compounds, and processes, which are conventional and generally widely known in the field of the invention described and their exact nature or type is not necessary for an understanding and use of the invention by a person skilled in the art, they should not be described in detail. However, where particularly complicated subject matter is involved or where the elements, compounds, or

processes may not be commonly or widely known in the field, the specification should refer to another patent or readily available publication which adequately describes the subject matter.

- (i) Claim or Claims: See 37 CFR 1.75 and MPEP § 608.01(m). The claim or claims must commence on separate sheet or electronic page (37 CFR 1.52(b)(3)). Where a claim sets forth a plurality of elements or steps, each element or step of the claim should be separated by a line indentation. There may be plural indentations to further segregate subcombinations or related steps. See 37 CFR 1.75 and MPEP § 608.01(i)-(p).
- (j) Abstract of the Disclosure: See MPEP § 608.01(f). A brief narrative of the disclosure as a whole in a single paragraph of 150 words or less commencing on a separate sheet following the claims. In an international application which has entered the national stage (37 CFR 1.491(b)), the applicant need not submit an abstract commencing on a separate sheet if an abstract was published with the international application under PCT Article 21. The abstract that appears on the cover page of the pamphlet published by the International Bureau (IB) of the World Intellectual Property Organization (WIPO) is the abstract that will be used by the USPTO. See MPEP § 1893.03(e).
- (k) Sequence Listing. See 37 CFR 1.821-1.825 and MPEP §§ 2421-2431. The requirement for a sequence listing applies to all sequences disclosed in a given application, whether the sequences are claimed or not. See MPEP § 2421.02.

4. The use of the trademark JAVA / JVM / JVMDI has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. 7.35.01 Trademark or Trade Name as a Limitation in the Claim

Claims 13, 14, 15, 28, 29, and 30 contain the trademark/trade name JAVA. Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe byte code instruction set programming language and, accordingly, the identification/description is indefinite.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 1-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pre Grant Publication 2001/0047510 A1 to Angel et al., in view of "Poor Man's Watchpoints", by Max Copperman and Jeff Thomas (1995).

Per claims 1, 16, and 31, Angel disclosed:

-compiling a function including a byte code sequence having a field byte code that accesses or modifies a field, the compiled function providing a native code and occupying a code space;

([0054], “the compiler accesses the source code and...converts the source code... (compiling a function)”, [0091], “it is useful to instrument memory access instructions (function / fields)...monitoring the variables (fields) of a program that access memory...”, [0111],

“...instructions being instrumented relate to memory variable (byte code that accesses field) accesses...”, Abstract, lines 1-2, “Instrumenting a computer program to provide instrumented byte code...” (byte code))

-generating an instrumentation code corresponding to a field watch of the field; ([0125],

“automatically editing the executable byte code representation of...methods for generating instrumented byte code.” (emphasis added), [0130], “There are many different ways to

instrument byte code...the editing is performed automatically as a separate post-compile process before the byte code is executed (statically)...”)

-inserting the instrumentation code to the native code. ([0133], “a user can supplement the byte code provided in the class instance with separate native code that may be used in conjunction

with the byte code.”) Regarding a method, computer program product, and system, Angel disclosed a method of byte code instrumentation. See FIG. 1-4 showing system and a computer program product embedded therein. At [0014], “instrumenting a byte code computer program...” Methods are further disclosed on pages 18-19.

Angel failed to disclose enable / disable options associated with the monitoring function added through instrumentation. However, Copperman and Thomas, disclosed “guarding execution of the instrumentation code if the field watch is not activated”. On page 40, The Debugger, 2nd paragraph, “When a watchpoint command is entered or enabled...” Copperman and Thomas discussed adding watchpoints through instrumentation, to debug software. They included features to enable / disable (guarding execution) the watchpoints.

Therefore, it would have been obvious, to one of ordinary skill in the art, at the time of the invention, to have modified Angel’s invention to include optional user features such as guarding execution of instrumented code, including watchpoints, because it makes the software user interactive and more flexible when debugging. Note that Angel discloses the use of a GUI [0208], but does not elaborate on user features likely to be available.

Per claims 2, 17 and 32, Copperman and Thomas disclosed:

-executing a field watch sequence. (Page 40, The Debugger, 3rd paragraph, “On receiving a watchpoint command, the debugger has to add an entry to the watch table and ensure that <cmd> (field watch sequence) is executed when the watchpoint is hit.”)

Therefore, it would have been obvious, to one of ordinary skill in the art, at the time of the invention, to have modified Angel’s invention to include optional user features such as guarding execution of instrumented code, including executing a field watch sequence, because executing a related function makes the software user-interactive and more flexible when debugging.

Art Unit: 2122

Per claims 3, 18, and 33, Copperman and Thomas disclosed:

-comparing a flag with a predetermined watch value to determine if the field watch is activated.

(Bottom of page 38, "A flag passed to the post-loader designates loads, stores, or both as patch targets." (Flag determines watch value to be activated.) As noted in the rejection of claim 1 above, an enable / disable option exists.)

Therefore, it would have been obvious, to one of ordinary skill in the art, at the time of the invention, to have modified Angel's invention to include optional user features such as guarding execution of instrumented code, including monitoring watchpoints through the use of flags, because it makes the software user interactive and more flexible when debugging. The use of a flag in software is well known.

Per claims 4, 19, and 34, Angel disclosed:

-inserting the instrumentation code before a field access or modification point. ([0143], "entry of the method is instrumented (before a field access point)...")

Per claims 5, 20 and 35, Angel disclosed:

-inserting the instrumentation code at end of the code space. ([0149], "exit point is instrumented.")

Per claims 6, 21, and 36, Angel disclosed:

-updating an offset of a jump instruction to a stub having the field watch sequence when the field watch is activated. ([0176], "The records contain the new offset of the byte code instructions,

Art Unit: 2122

which are moved due to insertion of instrumentation instructions.”, [0181], “the code table...to reflect the new offsets of the instrumented byte code...”, [0182], “byte code is modified to update branch (jump) instructions to reflect the new offsets...” Angel disclosed stubs at [0119], “indirect function calls added by instrumentation are set to ‘stub’ routines...”, meaning empty placemarked routines, whereas Applicant infers that the ‘stub’ is filled in with code containing ‘a field watch sequence when the field watch is activated’. Angel disclosed instrumented routines at [0091], “it is useful to instrument memory access instructions (fields)...monitoring (activated) the variables (fields) of a program that access memory...”)

Per claims 7, 22, and 37:

Angel provided details regarding the alteration of the code prior to compiling and branching (jumping) to instrumented code. Angel failed to disclose instrumentation code that could be enabled / disabled.

However, Copperman and Thomas disclosed:

-replacing a no-op sequence with a jump instruction to a stub having the field watch sequence when the field watch is activated. (Page 37, Introduction, 4th paragraph, “code patching - replacing each store and/or load instructions with an inline check or call to a function that gives control to the debugger if the accessed location is being watched, and subsequently executes...”

Also, page 40, The Debugger, 3rd paragraph, “On receiving a watchpoint command, the debugger has to add an entry to the watch table and ensure that <cmd> is executed (jump to stub / instrumentation code) when the watchpoint is hit. Also, page 40, last paragraph, “user’s command must be executed at the patch target (stub / instrumented code).” Copperman and

Art Unit: 2122

Thomas, page 41, 3rd paragraph, “added code to...disable, enable (replace no-op with jump) , and cancel individual watchpoints.”)

Therefore, it would have been obvious, to one of ordinary skill in the art, at the time of the invention, to have modified Angel’s invention by including information as provided by Copperman and Thomas regarding jumping to an inserted patch / instrumented code portion / stub for the purpose of optimizing through instrumentation, when altering control flow (enabling / disabling code execution) of a program as these are well known techniques, allowing a user to more flexibly debug software.

Per claims 8, 23, and 38, Angel disclosed:

-saving live global state, the live global state corresponding to an active register; ([0169], “...routine is then patched...at runtime, each call..is intercepted...”, [0170], “The patch uses an assembly code thunk that includes a small amount of assembly code and a class instance (data structure) that lets the patch code get control (this is done by saving state) before the native code routine starts...”, [0174], “The assembly thunk code may put a pointer...into whichever register (corresponding active register, for saving state)...”)

-executing an event hook function for an event corresponding to the field watch; ([0170], “patch code get control before the native code routine starts, and also gets control back when the native code routine exits.” (code is executed), also [0137], “The instrumentation program operates in cooperation with the VM runtime system and may take advantage of particular hooks...”)

Art Unit: 2122

-restoring the live global state. ([0170], “and also gets control back (restore state from registers) when the native code routine exits.”)

Per claims 9 and 24, Angel disclosed:

-pushing the live global state onto a stack. ([0153], “parameters that are passed during instrumentation are passed in a conventional fashion using the stack. Thus, the parameters are pushed on to the stack (pushing live global state onto a stack) prior to invocation of the monitoring function being called.”)

Per claims 10 and 25, Angel disclosed:

-passing an argument corresponding to the field; ([0093], “pass a variable pointer (passing an argument) to a function and have that pointer (corresponding to the field) be assigned to another variable within the function...”, [0114], “The run time instrumentation node may be a function call to a run time instrumentation function that uses the child node as one of the arguments and returns the value of the child node from the function call to make the value available for the operation node.”)

-calling a run-time library function related to the event. ([0113], “each of the specific run time instrumentation routines that is provided may include a function that is called to perform the instrumentation operation...”, [0119], “The run time instrumentation code may be implemented by using a separate set of routines (run-time library function) that is linkable to the code being

Art Unit: 2122

instrumented via the function calls...The initialization routine determines if an executable library corresponding to the run time instrumentation routine is available...")

Per claims 11 and 26, Angel disclosed:

-retrieve the live global state from the stack. ([0153], "parameters that are passed during instrumentation are passed in a conventional fashion using the stack..." It is well known that a VM is a stack machine, pushing and popping variables to / from the stack.)

Per claims 12 and 27:

Angel disclosed adding instrumentation through alteration of the code prior to compiling. Angel failed to disclose enabling / disabling the field watch.

However, Copperman and Thomas disclosed "activating / clearing the field watch by setting the flag" at page 40, Maintaining The Watch Table, 2nd paragraph, "When a command is disabled (cleared) or canceled, the last range in the table is copied over the range that is no longer being watched...If the table is empty, \$fp is set to zero..., page 41, 3rd paragraph, "...code to...disable (clear) , enable (activate) and cancel individual watchpoints..."

Therefore, it would have been obvious, to one of ordinary skill in the art, at the time of the invention, to have modified Angel, by using Copperman and Thomas's disclosure that provides more information regarding options for activating / clearing the watch field when instrumenting code because these features allow interactive user control, thereby making optimization through instrumentation more flexible.

Per claims 13 and 28, Angel disclosed:

-the function is a JAVA method. ([0014], "instrumenting a byte code (JAVA) computer program...", [0144], "entry of method is instrumented.")

Per claims 14 and 29, Angel disclosed:

-the field is a JAVA field in a JAVA virtual machine. ([0014], "instrumenting a byte code (JAVA) computer program...", [0147], "byte code is inserted into the method to cause a local line number variable (field) to be set to the new line number when the method runs.")

Per claims 15 and 30, Angel disclosed:

-the event hook function is compatible with a JAVA Virtual Machine Debug Interface (JVMDI). ([0137], "Instrumentation program operates in cooperation with the VM runtime system and may take advantage of particular hooks (a virtual machine debug interface) or calls provided by the vendors of the VM runtime system." A JAVA Virtual Machine Debug Interface, JVMDI, is a debug interface, that is trademarked by Sun Microsystems.)

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Steelman, whose telephone number is (703) 305-4564. The examiner can normally be reached Monday through Thursday, from 7:00 A.M. to 5:30 P.M. If

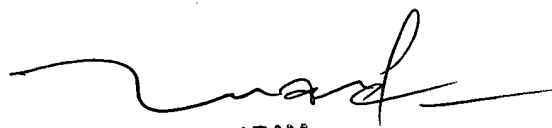
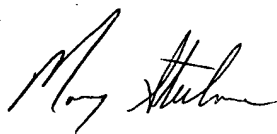
Art Unit: 2122

attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Dam can be reached on (703) 305-4552.

The fax phone number is (703) 872-9306 for regular communications and for After Final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Mary Steelman

02/12/2004



TUAN DAM
SUPERVISORY PATENT EXAMINER